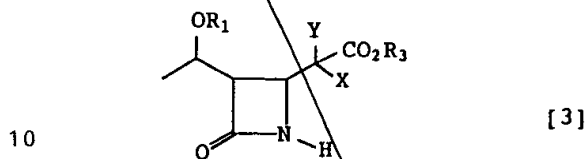


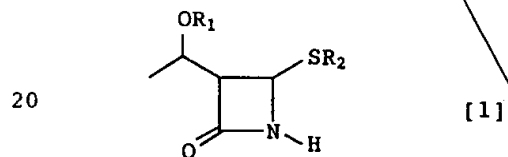
*What is claim 1?*  
~~Claims~~

Claim 1.

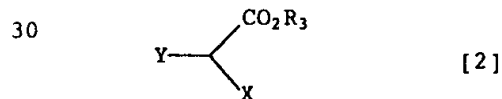
A process for synthesizing a 4-substituted azetidinone derivative represented by the general formula [3]:



(wherein OR<sub>1</sub>, CO<sub>2</sub>R<sub>3</sub>, X and Y are as defined below), characterized in that said process comprises reacting an azetidinone derivative represented by the general formula [1]:



(wherein OR<sub>1</sub> is a protected hydroxyl group; R<sub>2</sub> is a substituted or unsubstituted alkyl group, a substituted or unsubstituted alkenyl group or a substituted or unsubstituted aromatic group) with an ester compound represented by the general formula [2]:



(wherein CO<sub>2</sub>R<sub>3</sub> is an esterified carboxyl group; X and Y are the same or different and represent individually a substituted or unsubstituted alkyl group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted aralkyl group, a substituted or unsubstituted aryl group, a

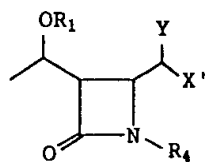
substituted or unsubstituted alkylthio group, a substituted  
or unsubstituted alkenylthio group, a substituted or  
unsubstituted aralkylthio group, a substituted or  
unsubstituted arylthio group, a substituted or unsubstituted  
5 alkyloxy group, a substituted or unsubstituted alkenyloxy  
group, a substituted or unsubstituted aralkyloxy group, a  
substituted or unsubstituted aryloxy group, a substituted or  
unsubstituted silyloxy group, a substituted or unsubstituted  
10 heterocyclic group, a substituted or unsubstituted  
heterocyclic-thio group, a substituted or unsubstituted  
heterocyclic-oxy group, a substituted or unsubstituted acyl  
group, a substituted or unsubstituted ester group, a  
substituted or unsubstituted thio ester group, a substituted  
or unsubstituted amide group, a substituted or unsubstituted  
15 amino group, a hydrogen atom or a halogen atom, or are taken  
together with each other to form a substituted or  
unsubstituted cycloalkan-2-on-1-yl group) in the presence of  
zinc and copper compounds.

Claim 2.

20 A process for synthesizing a 4-substituted azetidinone  
derivative represented by the general formula [3],  
characterized in that said process comprises treating an  
ester compound represented by the general formula [2] with a  
metal base to convert to the corresponding metal enolate,  
25 followed by reaction with an azetidinone derivative  
represented by the general formula [1] in the presence of a  
copper compound.

Claim 3.

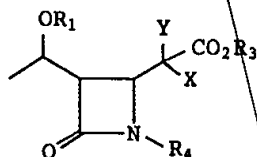
A process for synthesizing a 4-substituted azetidinone  
30 derivative represented by the general formula [5]:



[5]

(wherein OR<sub>1</sub> and Y are as defined above, and R<sub>4</sub> is as defined  
below; X' is the same as defined for X or a mercapto,

hydroxyl, formyl, carboxyl or thiocarboxyl group),  
characterized in that said process comprises converting a 4-  
substituted azetidinone derivative represented by the general  
formula [4]:



[4]

(wherein OR<sub>1</sub>, CO<sub>2</sub>R<sub>3</sub>, X and Y are as defined above; R<sub>4</sub> is a  
hydrogen atom or a protective group or a substituent group  
for amino group) to a carboxylic acid compound, followed by  
decarboxylation treatment.

Claim 4.

A process as claimed in Claim 1 or 2, wherein the ester  
compound represented by the general formula [2] is a  
halogenated acetic acid ester, a malonic acid ester, an 2-  
alkylmalonic acid ester, a 2-halogenated malonic acid ester,  
an 2-alkyl-acylacetic acid ester or a cycloalkan-2-on-1-  
carboxylic acid ester.

Claim 5.

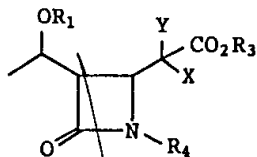
A process as claimed in Claim 1 or 2, wherein the ester  
compound represented by the general formula [2] is a  
bromoacetic acid ester, a malonic acid ester, a 2-  
methylmalonic acid ester, a 2-fluoromalonic acid ester, a 2-  
methylacetoacetic acid ester or a cyclohexan-2-on-1-  
carboxylic acid ester.

Claim 6.

A process as claimed in Claim 1 or 2, wherein the copper  
compound is a cuprous bromide dimethylsulfide complex.

Claim 7.

A 4-substituted azetidinone derivative represented by  
the general formula [4]:



[4]

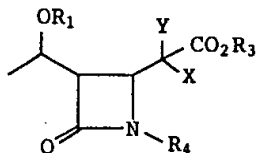
(wherein OR<sub>1</sub>, CO<sub>2</sub>R<sub>3</sub>, R<sub>4</sub>, X and Y are as defined above),  
 wherein the substituent at the 4-position is an esterified  
 carboxymethyl, di(esterified carboxy)methyl, 1-acyl-1-  
 esterified carboxyalkyl or 1-esterified carboxycycloalkan-2-  
 on-1-yl group.

Claim 8.

A 4-substituted azetidinone derivative as claimed in  
 Claim 7, wherein R<sub>4</sub> is a hydrogen atom or p-nitrobenzyloxy-  
 carbonylmethyl group.

Claim 9.

A 4-substituted azetidinone derivative represented by  
 the general formula [4]:



[4]

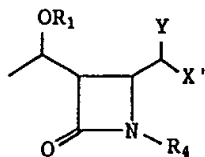
(wherein OR<sub>1</sub>, CO<sub>2</sub>R<sub>3</sub>, R<sub>4</sub>, X and Y are as defined above),  
 wherein the substituent at the 4-position is an alkoxy-  
 carbonylmethyl, di(alkoxycarbonyl)methyl, 1-acetyl-1-  
 alkoxycarbonylethyl, 1-acetyl-1-alkenyloxy-carbonylethyl, 1-  
 acetyl-1-alkoxyloxy-carbonylethyl or 1-alkenyloxy-carbonyl-  
 cyclohexan-2-on-1-yl group.

Claim 10.

A 4-substituted azetidinone derivative as claimed in  
 Claim 9, wherein R<sub>4</sub> is a hydrogen atom or p-nitrobenzyloxy-  
 carbonylmethyl group.

Claim 11.

A 4-substituted azetidinone derivative represented by  
 the general formula [5]:



[5]

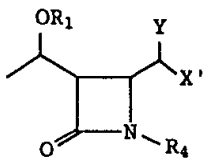
(wherein OR<sub>1</sub>, R<sub>4</sub>, X' and Y are as defined above), wherein the substituent at the 4-position is an esterified carboxymethyl, 1-acylalkyl or cycloalkan-2-on-1-yl group.

Claim 12.

5 A 4-substituted azetidinone derivative as claimed in Claim 11, wherein R<sub>4</sub> is a hydrogen atom or p-nitrobenzyl-oxy-carbonylmethyl group.

Claim 13.

10 A 4-substituted azetidinone derivative represented by the general formula [5]:



[5]

A

(wherein OR<sub>1</sub>, R<sub>4</sub>, X' and Y are as defined above), wherein the substituent at the 4-position is an alkoxycarbonylmethyl, 1-acetyethyl or cyclohexan-2-on-1-yl group.

Claim 14.

25 A 4-substituted azetidinone derivative as claimed in Claim 13, wherein R<sub>4</sub> is a hydrogen atom or a p-nitrobenzyl-oxy-carbonylmethyl group.

Add  
A<sub>2</sub>